

REMARKS

Claims 1-26 are pending in the case. Further examination and reconsideration of pending claims 1-26 are respectfully requested.

Section 112, first paragraph, Rejections

Claim 23 was rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. As will be set forth in more detail below, the § 112, first paragraph, rejection of claim 23 is respectfully traversed.

Claim 23 complies with the enablement requirement. The Office Action states that “the specification fails to enable how a non-aerial imaging system can be used when obtaining an aerial image for comparison, as claimed in dependent claim 26 and independent claim 23.” (Office Action -- page 2). However, claim 23 and independent claim 20 from which claim 23 depends do not recite using a non-aerial imaging system to obtain an aerial image for comparison. For instance, independent claim 20 recites:

A method, comprising: inspecting a reticle containing a design pattern for non-transient defects; acquiring aerial images of the reticle for different values of a member of a set of lithographic variables; and determining a presence of transient repeating defects on the reticle by subtracting the non-transient defects from the aerial images and comparing at least one pair of the aerial images corresponding to at least two of the different values.

In addition, claim 23 recites, in part: “wherein said inspecting is performed using a non-aerial imaging reticle inspection system.” Therefore, claim 23 is directed to a method that includes inspecting a reticle for non-transient defects using a non-aerial imaging reticle inspection system, acquiring aerial images of the reticle, and subtracting the non-transient defects from the aerial images. As such, contrary to the assertions in the Office Action, claim 23 does not recite using a non-aerial imaging system to obtain an aerial image. Furthermore, support for the limitations

recited in claim 23 can be found in the Specification, for example, on page 5, line 24 to page 6, line 16 and page 17, line 24 to page 18, line 7. These and other portions of the Specification describe the subject matter of claim 23 in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

For at least the reasons set forth above, claim 23 complies with the enablement requirement. Accordingly, removal of the § 112, first paragraph, rejection of claim 23 is respectfully requested.

Section 112, second paragraph, Rejections

Claim 23 was rejected under 35 U.S.C. § 112, second paragraph, as being vague and indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As will be set forth in more detail below, the § 112, first paragraph, rejection of claim 23 is respectfully traversed.

Claim 23 is clear and definite. The Office Action states that “It is unclear as to how claim 23’s claim of a non-aerial inspection system can be used when claim 20, which claim 23 depends on, utilizes aerial images for inspection.” (Office Action -- pages 2-3). However, as set forth in detail above, claim 23 is directed to a method that includes inspecting a reticle for non-transient defects using a non-aerial imaging reticle inspection system, acquiring aerial images of the reticle, and determining a presence of transient repeating defects on the reticle by subtracting the non-transient defects from the aerial images and comparing at least one pair of the aerial images corresponding to at least two of the different values. As such, claim 23 is clear as to how a non-aerial imaging reticle inspection system can be used (e.g., for inspection for non-transient defects) in a method that uses aerial images (e.g., for determining a presence of transient repeating defects) from which the non-transient defects are subtracted.

For at least the reasons set forth above, claim 23 is clear and definite. Accordingly, removal of the § 112, second paragraph, rejection of claim 23 is respectfully requested.

Section 102 Rejections

Claims 1, 3-6, 9, 10, 14, 15, and 17 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,701,004 to Shykind et al. (hereinafter “Shykind”). As will be set forth in more detail below, the § 102 rejections of claims 1, 3-6, 9, 10, 14, 15, and 17 are respectfully traversed.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), MPEP § 2131. The cited art does not disclose all limitations of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

The cited art does not teach acquiring aerial images of a reticle. Independent claim 1 recites, in part: “A method, comprising: acquiring aerial images of a reticle.” Independent claims 17 and 20 recite similar limitations.

Shykind discloses detecting defects on photomasks. Shykind states that “Defects on at least one photomask are detected by patterning alternating dies on a wafer with different process conditions.” (Shykind -- col. 1, lines 39-41). Shykind also states that “The process begins, at step 800, by printing alternating dice of a silicon wafer using at least one photomask in a photo-exposure process.” (Shykind -- col. 4, lines 36-38). In addition, Shykind states that “A die-to-die inspection is performed by comparing several sets of dice printed with each reticle.” (Shykind -- col. 4, lines 44-46). Therefore, Shykind teaches printing a reticle onto a wafer and detecting defects on the reticle by inspecting the wafer. As such, Shykind does not teach acquiring aerial images of a reticle. In particular, the dice printed on the wafer are not aerial

images of the reticle. More specifically, as is known by one of ordinary skill in the art, in lithography an aerial image of a reticle is projected onto a wafer. However, the pattern printed on the wafer is not an aerial image of the reticle since the pattern is printed in a resist or other material that modifies the aerial image that was projected onto the wafer. As such, although Shykind teaches printing dies on a wafer using a reticle, such printing of the dies does not include, inherently or otherwise, acquiring aerial images of a reticle. In addition, inspecting a wafer on which such dies are printed as taught by Shykind does not, inherently or otherwise, include acquiring aerial images of a reticle. Therefore, Shykind does not teach acquiring aerial images of a reticle, as recited in claims 1, 17, and 20. As a result, Shykind does not teach all limitations of claims 1, 17, and 20.

For at least the reasons set forth above, independent claims 1, 17, and 20, as well as claims dependent therefrom, are not anticipated by the cited art. Accordingly, removal of the § 102 rejections of claims 1, 3-6, 9, 10, 14, 15, and 17 is respectfully requested.

Section 103 Rejections

Claims 7, 16, 20-21, and 23-26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shykind in view of “Critical Area Extraction for Soft Fault Estimation” by Allan et al. (hereinafter “Allan”). Claims 2, 18, and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shykind in view of U.S. Patent No. 5,046,109 to Fujimori et al. (hereinafter “Fujimori”). Claim 22 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Shykind in view of Allan and further in view of Fujimori. Claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Shykind in view of U.S. Patent No. 4,578,810 to MacFarlane et al. (hereinafter “MacFarlane”). Claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Shykind in view of U.S. Patent No. 5,444,480 to Sumita (hereinafter “Sumita”). Claims 12 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shykind in view of U.S. Patent Application Publication No. 2002/0181756 to Shibuya et al.

(hereinafter “Shibuya”). As will be set forth in more detail below, the § 103(a) rejections of claims 2, 7, 8, 11-13, 16, and 18-26 are respectfully traversed.

To establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion or incentive to do so. *In re Bond*, 910 F.2d 81, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990). The cited art does not teach or suggest all limitations of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

The cited art does not teach or suggest acquiring aerial images of a reticle, as recited in claims 1, 17, and 20. As set forth in detail above, Shykind does not teach all limitations of claims 1, 17, and 20.

Shykind also does not suggest all limitations of claims 1, 17, and 20. For example, Shykind states that “An enhanced technique to obviate difficulties encountered in finding defects near the OPC features takes advantage of an OPC feature characteristic that makes the OPC features contribute more strongly to the printed image patterns on the wafer.” (Shykind -- col. 3, lines 10-14). Therefore, Shykind teaches that using image patterns of a reticle printed on a wafer obviates difficulties in finding defects near OPC features. As such, Shykind teaches the desirability of using image patterns printed on a wafer to detect defects on a reticle. However, as set forth in detail above, acquiring such image patterns of a reticle printed on a wafer does not include acquiring aerial images of the reticle. Therefore, although Shykind teaches the desirability of using image patterns printed on a wafer to detect defects on a reticle, Shykind does not suggest the desirability of using aerial images of a reticle to detect defects on the reticle. As such, even if the prior art method of Shykind can be modified such that the method detects defects on a reticle using aerial images instead of printed image patterns on a wafer, the resultant modification is not obvious because the prior art does not suggest the desirability of the

modification. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). MPEP 2143.01. Therefore, Shykind does not teach or suggest acquiring aerial images of a reticle, as recited in claims 1, 17, and 20. Consequently, Shykind does not teach or suggest all limitations of claims 1, 17, and 20.

Shykind also cannot be combined with any of the other cited art to overcome the deficiencies in the teachings of Shykind. For example, Allan discloses critical area extraction for soft fault estimation. However, Allan does not teach or suggest acquiring any images of a reticle. As such, Allan does not teach or suggest acquiring aerial images of a reticle, as recited in claims 1, 17, and 20. Consequently, Allan does not teach or suggest all limitations of claims 1, 17, and 20 and cannot be combined with Shykind to overcome deficiencies contained therein.

Fujimori discloses a pattern inspection apparatus. Fujimori states that “The image of a pattern within a small region of the real pattern is picked-up by an image pick-up device 14.” (Fujimori -- col. 3, lines 10-12). However, Fujimori does not disclose that the image pick-up device acquires aerial images of a reticle. As such, Fujimori does not teach or suggest acquiring aerial images of a reticle, as recited in claims 1, 17, and 20. Consequently, Fujimori does not teach or suggest all limitations of claims 1, 17, and 20 and cannot be combined with Shykind and/or Allan to overcome deficiencies contained therein.

MacFarlane discloses a system for printed circuit board defect detection. MacFarlane states that “It is a primary object of the present invention to provide an arrangement for inspecting a printed wiring circuit board based upon logical decisions resulting from an examination of binary image patterns representing the circuit board.” (MacFarlane -- col. 2, lines 64-68). In addition, MacFarlane states that “The sensors are binary in that they register a ONE if looking at conductive material, and a ZERO otherwise.” (MacFarlane -- col. 4, lines 48-50). Therefore, MacFarlane discloses acquiring a binary image of a printed circuit board. However,

MacFarlane does not teach or suggest acquiring aerial images of a reticle, as recited in claims 1, 17, and 20. Consequently, MacFarlane does not teach or suggest all limitations of claims 1, 17, and 20 and cannot be combined with Shykind, Allan, Fujimori, or any combination thereof to overcome deficiencies contained therein.

Sumita discloses a method of inspecting a solid body for foreign matter. Sumita states that “An automatic inspecting device for automatically inspecting a vial has an imaging unit such as a CCD camera or the like for imaging a vial and a cake sealed therein at various angles.” (Sumita -- col. 3, lines 60-63). Therefore, Sumita discloses acquiring an image of a vial and a cake sealed therein. However, Sumita does not teach or suggest acquiring aerial images of a reticle, as recited in claims 1, 17, and 20. Consequently, Sumita does not teach or suggest all limitations of claims 1, 17, and 20 and cannot be combined with Shykind, Allan, Fujimori, MacFarlane, or any combination thereof to overcome deficiencies contained therein.

Shibuya discloses a method for analyzing defect data and inspection apparatus and review system. In particular, Shibuya discloses detecting and reviewing defects on wafers. (*See*, for example, Shibuya -- paragraphs 0031-0089). However, Shibuya does not teach or suggest acquiring aerial images of a reticle, as recited in claims 1, 17, and 20. Consequently, Shibuya does not teach or suggest all limitations of claims 1, 17, and 20 and cannot be combined with Shykind, Allan, Fujimori, MacFarlane, Sumita, or any combination thereof to overcome deficiencies contained therein.

For at least the reasons stated above, independent claims 1, 17, and 20, as well as claims dependent therefrom, are patentably distinct over the cited art. Accordingly, removal of the § 103 rejections of claims 2, 7, 8, 11-13, 16, and 18-26 is respectfully requested.


CONCLUSION

This response constitutes a complete response to all issues raised in the Office Action mailed February 8, 2007. In view of the remarks presented herein, Applicants assert that pending claims 1-26 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned earnestly requests a telephone conference.

The Commissioner is authorized to charge any fees, which may be required, or credit any overpayment, to deposit account number 02-0393.

Respectfully submitted,

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